A 64x64 Low Noise Cryogenic Readout Multiplexer for Far IR Focal-Plane Arrays, Phase I

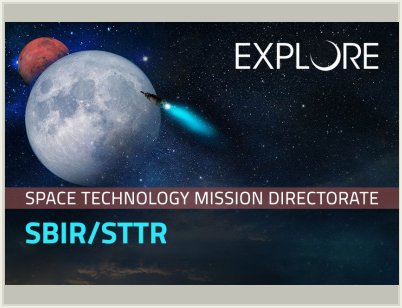
Completed Technology Project (2009 - 2009)

Project Introduction

We propose to investigate the feasibility of developing a low noise, two-side buttable, 64x64 readout multiplexer with the following key design features: 1- By far the largest readout array developed for far IR detectors to date. Four of these readout can be butted together to form a >16k-pixel mosaic array satisfying the need of the next generation of astronomical instruments. 2- Optimized for use with far infrared detectors requiring low bias levels. The unit-cell design will maintain constant bias across the detector during the integration eliminating non-linearity and detector debiasing. The design will also minimize the pixel-to-pixel DC variation which improves the bias uniformity across all pixels of the array. 3- Capable of operation at cryogenic temperatures at least as low as 1.6K. Advanced monolithic cryo-CMOS technology will guarantee deep cryogenic operation with minimal impact on noise performance. 4- Offers the potential of being directly hybridized to IR detector arrays using indium-bump technology. This technology has been identified by NASA as well as the science and astronomy community as key for future far IR astronomy. It fits well within the scope of the SBIR Subtopic S1.04 and will be a benefit to many large and small NASA missions including SAFIR/CALISTO and SOFIA.

Anticipated Benefits

Aerospace industry: In addition to the aerospace companies that are under contract to NASA and directly participate in the space program, there are those that independently manufacture infrared detector arrays in large formats. Some aerospace companies that would be interested in our product are Raytheon Vision Systems, Boeing, Rockwell, and Ball Aerospace. Science groups at universities and national labs: Astronomical science instruments for observations at ground-based observatories and instruments for basic research. Astronomical instruments developed under Program such as SAFIR/CALISTO, science instruments for SOFIA, upcoming projects under Astrobiology Program, balloon-borne instruments for atmospheric research, and laboratory science instruments.



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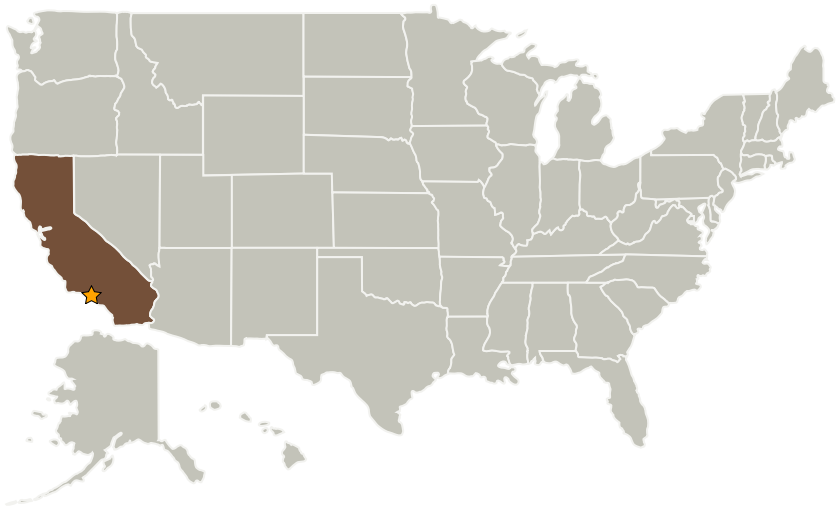
Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★Jet Propulsion Laboratory(JPL)	Lead Organization	NASA Center	Pasadena, California
TechnoScience Corporation	Supporting Organization	Industry	Palo Alto, California

Primary U.S. Work Locations
California

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Jet Propulsion Laboratory (JPL)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Project Manager:

Celestino Jun Rosca

Principal Investigator:

Jam Farhoomand

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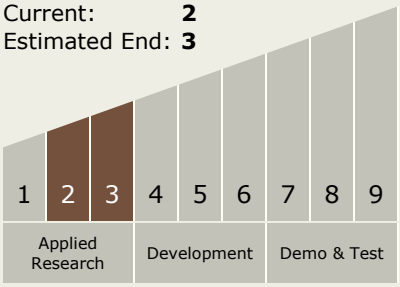
Technology Maturity (TRL)

Start: **2**
Current: **2**
Estimated End: **3**



Technology Areas

Primary:

- TX08 Sensors and Instruments
  - TX08.1 Remote Sensing Instruments/Sensors
    - TX08.1.1 Detectors and Focal Planes